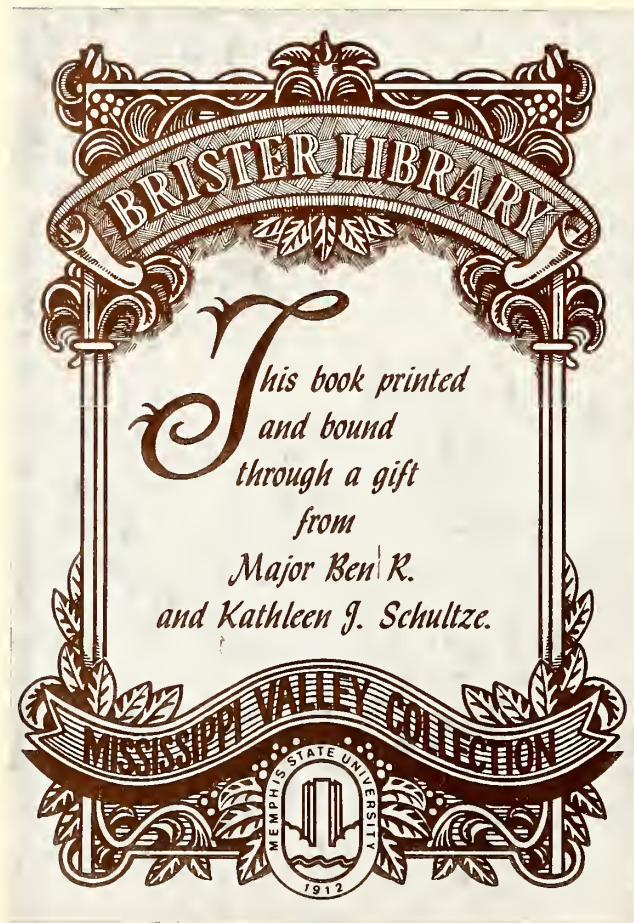


ORAL HISTORY OF THE TENNESSEE VALLEY AUTHORITY
INTERVIEWS WITH
WYLIE BOWMASTER

BY - CHARLES W. CRAWFORD
TRANSCRIBER - BETTY WILLIAMS
ORAL HISTORY RESEARCH OFFICE
MEMPHIS STATE UNIVERSITY



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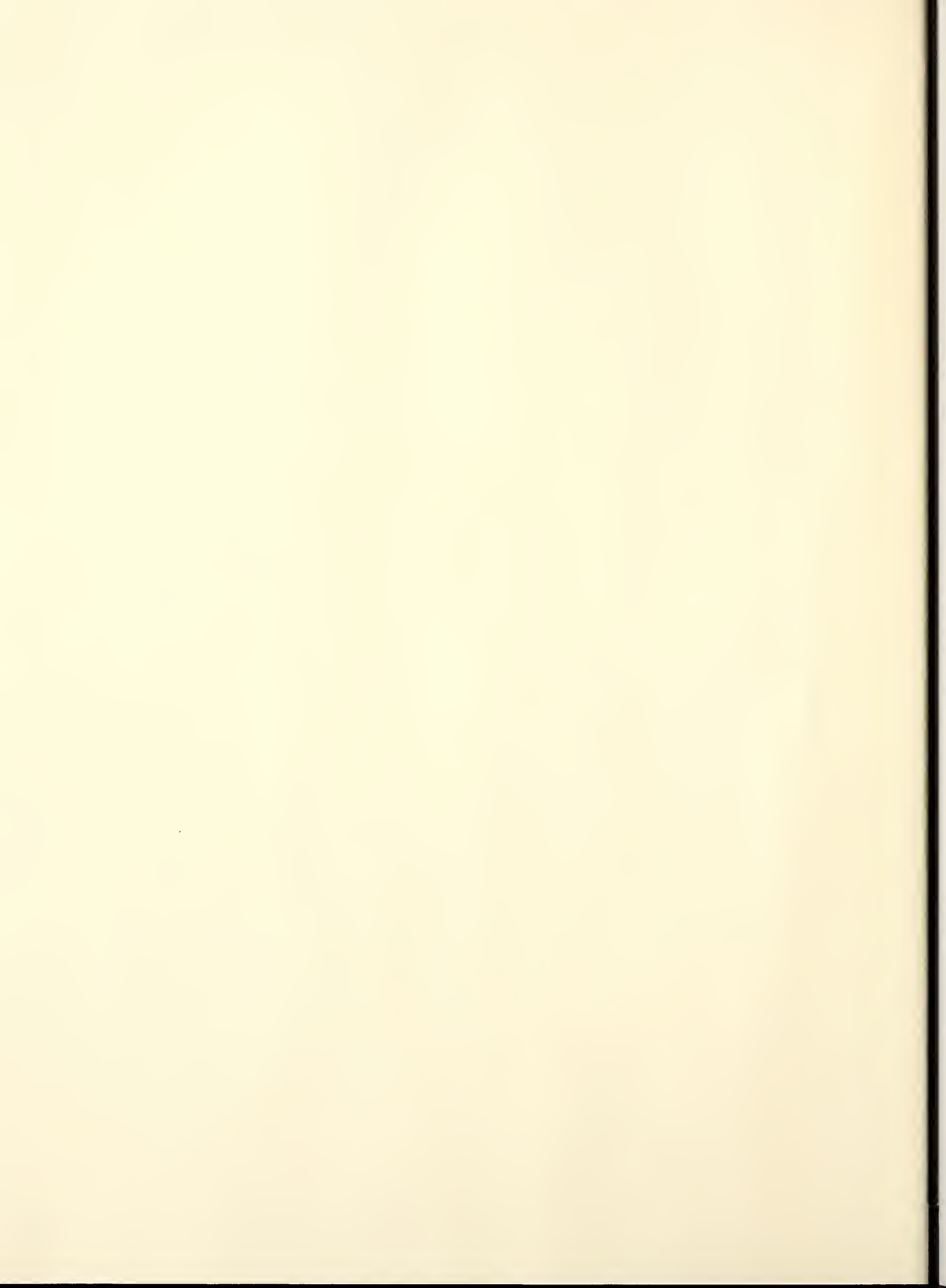
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ORAL HISTORY OF THE TENNESSEE VALLEY AUTHORITY

INTERVIEWS WITH WYLIE BOWMASTER

JANUARY 31, 1975

BY CHARLES W. CRAWFORD

TRANSCRIBER - BETTY WILLIAMS

ORAL HISTORY RESEARCH OFFICE

MEMPHIS STATE UNIVERSITY



MEMPHIS STATE UNIVERSITY
ORAL HISTORY RESEARCH OFFICE

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PLACE Knoxville, Tennessee

DATE January 31, 1975

Wylei Bowmaster
(Interviewee)

Charles W. Crawford
(For the Mississippi Valley Archives
of the John Willard Brister Library
of Memphis State University)



THIS IS THE ORAL HISTORY RESEARCH OFFICE OF MEMPHIS STATE UNIVERSITY.
THIS PROJECT IS THE "ORAL HISTORY OF THE TENNESSEE VALLEY AUTHORITY."
THE DATE IS JANUARY 31, 1975. THE PLACE IS KNOXVILLE, TENNESSEE. THE
INTERVIEW IS WITH MR. WYLIE BOWMASTER. THE INTERVIEW IS BY DR. CHARLES
W. CRAWFORD, THE DIRECTOR OF THE ORAL HISTORY RESEARCH OFFICE OF MEMPHIS
STATE UNIVERSITY. TRANSCRIBED BY BETTY WILLIAMS. INTERVIEW # 1.

DR. CRAWFORD: Mr. Bowmaster, I suggest we start by getting some
biographical information that you could give start-
ing as early as you can and going up to the time you became associated
with TVA.

MR. BOWMASTER: Well, Dr. Crawford, I was born in Kansas City,
Missouri, and came with my parents to live in
Michigan in about 1919. My birth was December 22, 1908. So I was some
eleven or twelve years old when I came to Michigan. In Michigan we lived
in one of the suburbs of Grand Rapids where I went to high school and
then went to the junior college in Grand Rapids and from there after
two years in a junior college I went to Michigan State, now Michigan
State University, at that time Michigan State College. (Tape was inaudible)
After spending the summer there I thought it would be wise to get a little
more education so I went back to Michigan State College as a graduate
student and part-time instructor. I stayed there for the next three



years or thereabouts and then came to TVA. I came to work for TVA in April, 1934. I had accumulated then a masters degree in civil engineering from Michigan State College. I remember so well that I applied in those deep Depression days a number of places for jobs and so was quite elated when I did get a telegram from TVA offering me a job. As I recall, it was at a salary of \$1800 a year, less 15%, which was the economy move of the Depression days.

Unfortunately at that particular moment, I was working under one of the WPA or CWA projects at the time which was conducting a survey in the western part of the state of Michigan under which we were setting monuments, benchmarks and running controls surveys. I felt I couldn't leave it immediately and so responded to TVA that I would be available in a month or six weeks when this particular project came to a good stopping point.

That job was no longer available at the end of a month or six weeks but they did offer another job to my surprise at considerable lower pay rate. But anyhow I did show up here in Knoxville in April of 1934 with an old Model A Ford and almost no money in my pocket, but at least thankful to have a job under those conditions.

DR. CRAWFORD: What were your first impressions of the Valley area, Mr. Bowmaster, and had you ever seen it before?

MR. BOWMASTER: I had never seen it before to any degree, although I had driven through here once. My first impressions were that here is a part of the world that civilization seems to have bypassed. I was astounded at the unpainted houses, the number of people still

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living in log cabins, the very narrow roads in much of the hill country with the houses built right against the roads. It was just a step backward it seemed to me of several hundred years after having lived in Michigan in an area that it seemed to me was much more developed than this was. And so to me there was a great job for some organization or somebody to sort of bring this area up to the Twentieth Century.

DR. CRAWFORD: Were you headquartered in Knoxville when you first arrived?

MR. BOWMASTER: Yes.

DR. CRAWFORD: Were you married at that time?

MR. BOWMASTER: No I was not married. I was single.

DR. CRAWFORD: Where did you live in Knoxville?

MR. BOWMASTER: When I came to TVA, as I mentioned, I drove down in a Model A ford. I came to the office, was interviewed, and put on the payroll. That evening I spent with some of the fellows in TVA who had an apartment in West Knoxville. The next day I found a boarding house in West Knoxville. It was, as I recall, on Highland Avenue at about Twelveth Street. A Jewish woman rented about three rooms from her house and a couple of houses down the street was another woman who served meals in those Depression days. So between these two I had a very comfortable living situation within walking distance of the TVA offices in downtown Knoxville.

DR. CRAWFORD: What impression did you get of the agency itself and the people working in it when you arrived at TVA?

THE

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MR. BOWMASTER: Well, I was very much impressed by the high caliber of the engineering staff that I bumped into. These were engineers considerably older than I was of course, who had had much experience in the engineering field. They seemed to be running around a great deal trying to get things organized and get their feet on the ground. I sort of felt that we were spinning our wheels for a little bit, but I considered it quite an opportunity to work with a group of people like that. They were certainly knowledgeable and enthusiastic about what they were doing and they were bent on doing that very best job they could.

DR. CRAWFORD: You had favorable impressions then of the dedication and support of TVA by the personnel?

MR. BOWMASTER: Very strong!

DR. CRAWFORD: What did you think of the engineering competence and training of the employees when you arrived?

MR. BOWMASTER: The employees that I met I thought were extremely competent and well trained. It seemed to me then as it does today that TVA was most fortunate that they were able to obtain people like Dr. Arthur E. Morgan from the Memphis engineering firm which he headed and who brought with him a number of members of his staff that had worked together for many years. These were competent people in the water resources field who had worked together and so they fitted together, I thought, as a good team.

Now again I came into what now is called The Division of Water Control Planning and the group I came to was headed by Al Fry who passed away just

a few weeks ago. Al Fry had been with Morgan Engineering. Along with Al Fry I was associated with Sherman Woodward and Jim Bowman. They had been with the Miami Conservancy District which had made a tremendous name for itself in the engineering work they did. There were a number of other people in the organization who also came from the Miami Conservancy District. My immediate supervisor, J. H. Kimball, who headed up what was then called The Flood Control Section had been one of the engineers with the Miami Conservancy District with Sherman Woodward, who became some time along the way the head of the division of Water Control Planning.

So here were men experienced in the field of flood control who had carried out what was at that time probably the most outstanding flood control project in the world. I highly respected those people, and considered it an opportunity to work with them in this field.

DR. CRAWFORD: How large was the Water Control Planning Division at that time?

MR. BOWMASTER: The group that became the Water Control Planning Division was not very large at least as far as the Knoxville office was concerned. There might have been ten or fifteen people, probably not more than that, although there were some people in the field. Al Fry was then head of the Hydraulic Data Branch, I believe it went by that name in those days, and they had quite a number of field people. I doubt if there were more than thirty or forty people all together in the Division for Water Control Planning at that

time.

DR. CRAWFORD: What were your major duties at that time, Mr. Bowmaster?

MR. BOWMASTER: Well, I was assigned to J. H. Kimball who then headed what was called the Flood Control Section.

And our job then was collecting and analyzing the information on fall and streamfall that was needed in planning the reservoir projects that TVA was considering. At that date construction had been started on Norris Dam, but Norris Dam was not designed by TVA. It was designed largely as I recall, by the Bureau of Reclamation. True, the entire Tennessee River and its tributaries had been studied by the Army Corps of Engineers and the Corps had issued their "308" report on the Tennessee River and its tributaries. In this report they had strongly recommended the construction of a dam at the Norris Dam site. My recollection is that in the passage of the TVA Act it was understood that this dam would be built. It would be built not only because it was necessary as a part of the water control system but also because it was needed to immediately put as many people as possible to work in those Depression days.

DR. CRAWFORD: Where did you get your information you needed about flooding conditions on the river?

MR. BOWMASTER: We had several excellent sources of information.

First, of course, there was the "308" report of the Corps of Engineers. This report was some three inches thick and contained separately a large number of drawings, particularly topo-

graphical maps from aerial photographs and so we were blessed with a very excellent collection of maps and other documents of that sort. In addition to that in about 1933 during again the Depression years, as one of the WPA projects organized in Chattanooga, a collection was made of rainfall and stream-flow data. Now this was pulled together by the WPA employees from a variety of sources. But this made it directly available to us.

Then too the U.S. Geological Survey had issued a number of water resources bulletins, one of which concerns floods in the Tennessee Valley and another was their typical bulletin that gives stream-flow information. So we were blessed with probably more information on the Tennessee River, on the water-shed, rainfall information, stream-flow information than almost any agency upon setting up shop. We just had the very best to work with.

DR. CRAWFORD: Why had the WPA studies been done?

MR. BOWMASTER: I presume that this was done because it was anticipated that something like TVA would be set up here in the Valley or it was not set up that the Corps of Engineers would proceed with construction of dams and reservoirs as they had planned and as they had recommended in the "308 report on the Tennessee River.

DR. CRAWFORD: What year did you say it had been done?

MR. BOWMASTER: It was done I believe, in 1932 or 1933. When I came here in 1934 some of that material was available to us and some of the employees in what is now Water Control

Planning were the very people who had worked on this data in Chattanooga. So we had a very good tie there.

DR. CRAWFORD: The data must have been very current for I don't believe WPA started before 1933 under Franklin Roosevelt when he came into office. And of course, your work on that in '34 would have been soon thereafter. What did you think of the quality of the "308" report?

MR. BOWMASTER: I always thought the "308" report was of high quality. Now true it had its shortcomings. The engineers who had prepared that report, like all engineers, never have as much information, never have as much data, as they would like and never have as much time as they would like to put that data together. So with all things considered I thought the "308" report was a high quality report. And without it TVA would never have been able to get started the way it did.

DR. CRAWFORD: When was it prepared?

MR. BOWMASTER: I am not too clear on that. It must have been about 1930, but I would not be sure. Many of the maps that were made in connection with the "308" report were dated 1928, 1929, and some of the 1930, but I don't recall the date of the report.

DR. CRAWFORD: Did the engineers in TVA generally respect the abilities and the professional work of the Corps of Engineers?



MR. BOWMASTER: Oh they certainly did. The Corps of Engineers was highly regarded. Some of our engineers had worked for the Corps of Engineers. Certainly they had all worked closely with them and they respected the Corps of Engineers. It was a good engineering organization.

DR. CRAWFORD: What sort of flood information were you seeking? Were you attempting to determine the maximum possible flood in the Valley area?

MR. BOWMASTER: Well, one of the principal jobs that we had in the flood control branch at that time was to develop what we called the maximum probable flood. Engineering terminology changed over the years, thinking has changed, but at that time the head of the flood control section, J. H. Kimball, was very much concerned over the developing a method of determining what he called the maximum probable flood. Now he wanted this information in the design of the dams but particularly for use in designing a flood control system that would protect the city of Chattanooga and other vulnerable points in the Valley. So I worked a great deal on this. . .

In fact, as I recall about 1940 or thereabouts I wrote a thesis on this subject of determining maximum probable floods and used that in completing the work towards the professional degree of Civil Engineer at what is now Michigan State University. And so I was very much concerned in that field. All of the staff were concerned in developing a method for determining the maximum probable flood at any location in the Valley.

DR. CRAWFORD: How far back did your data on floods go?

MR. BOWMASTER: Well, we had here in the Valley probably as good

data on stream floods, on stream-flow, on rainfall as there is available in the country. And we spent a great deal of time searching the records and otherwise trying to get more data on the early floods.

Fortunately a number of stream gauges had been established in the Tennessee Valley way back in the early days. Those were in the days prior to the establishment of the U.S. Weather Bureau as I recall. And so we had a gauge in Chattanooga in which records began sometime prior to 1870. Then we had records--long term records--similar to those at Chattanooga at a gauge on the Tennessee River at Florence. We also had records at Knoxville and at several other points so that we had unusually good records of stream-flow in the Valley.

We had also records some of which were collected by Corps of Engineers from residents of the area who kept diaries. Some of these diaries extended even farther back. These people had recorded in their daily diary how much it rained, how high the river was, and things of that sort and then of course we had the newspaper records. One of our earliest jobs was to pull together all that sort of data that we could and try and establish to the best of our ability as complete a record of flood history here in the Tennessee Valley as it was possible to-gether.

In connection with that we undertook a kind of survey that proved most interesting. We had in our little flood control branch an older fellow by the name of Frank Davis who had worked for the Corps of

Engineers at one time, and he was a very much farmerish-looking, acting and speaking person (if you could describe someone that way). He was a kind of a fellow that could go with our farmers, gain their confidence, talk with them and so on. So Frank Davis along with an assistant spent a number of years in the field going up and down the Tennessee River and its tributaries talking with farmers and anybody else to pull together anything that he could about the history of floods on the river. Frank did a wonderful job on this. He was the kind of a fellow that would sit down with one farmer, spend an hour or two chatting, draw out of that fellow's memory that so and so had carved a notch on the door of his house that marked the height of a flood. And so Frank would go see that fellow. He would find the notch if at all possible or maybe it was a spike driven in a tree and then he and his assistant would run levels to that and get the elevation and write the whole history of that flood mark.

This way we got a tremendous amount of data that was just as good as we could get. We eventually plotted those both on maps to show their location and on flood profiles of the river to see how those compared one with another. Again also we often found that people's recollection was not accurate. They would recall that a notch in the doorway that recorded the height of the flood of 1867. Well, when we got it plotted on our profiles we found it wasn't the 1867 flood it was a flood that occurred a few years later or a few years earlier. And we found great confusion in some areas between the flood of 1867, 1886,



and 1897.

But where such confusion developed we would often ask Frank Davis to go back into the field to see if there was anyone else who could identify flood marks or who might be able to verify that this was the 1886 flood instead of the 1867 flood. It had seemed to me that TVA had probably gone to almost extreme efforts to get as good a history on floods and flood marks as was possible to get.

DR. CRAWFORD: What were the earliest years you were able to find information about the floods?

MR. BOWMASTER: From Chattanooga up to Knoxville on the Tennessee River and on some of the tributaries in this area we had very good information on the Flood of 1867. That was the earliest flood of which we had any very good records. Now we often heard that there had been earlier floods, but the 1867 flood was apparently the largest flood of which there was any record from perhaps the year 1800 on. Some of the old diaries and other records indicated that 1867 flood in this area was the largest in the remembrance of anyone living in the area. And so as far as we know from Chattanooga up to Knoxville and in this general area that was the largest flood. Downstream from Chattanooga we had quite some difficulty, because at the lower end of the river the flood of 1897 was much larger than the flood of 1867, and the two floods crossed some place in the vicinity of Florence or Decatur. This caused a great deal of confusion and a great deal of difficulty in trying to separate out those floods. We did find occasional ref-

erences indicated that those floods were smaller than the flood of 1867 and the 1897 flood.

DR. CRAWFORD: Was the year 1867 also a flood year for the Mississippi Valley?

MR. BOWMASTER: Offhand I don't recall. It may have been, but I don't remember that we gave much consideration to the Mississippi River flood in 1867. It sure doesn't ring a bell with me.

DR. CRAWFORD: Of course that was outside of your area so I assume this water passed on down the river, but there are numerous other tributaries flowing into the Mississippi. I don't suppose that data would have helped you? Were you able to find any sort of information about earlier floods than the records about the time of 1867?

MR. BOWMASTER: No, except the two floods I mentioned, the 1826 and I believe it was 1847. We had references to those floods in diaries, but they (the diaries) were quite clear that the 1867 was larger than both the 1826 and 1847.

DR. CRAWFORD: What was the extent of the 1867 Flood? Did you get information about how high it was or how much territory was covered?

MR. BOWMASTER: Yes. Collecting flood marks as we did, we had accurate information on the height of that flood from Chattanooga on up to Knoxville and some of the tributaries and



this study fitted in very well with our study on flood heights. We had taken some of the more recent floods--more particularly the flood of 1936--and computed roughness coefficients along the Tennessee River for that flood using cross sections taken from the topographic maps and then applied these roughness coefficients to estimated flows for floods like that of 1867 and other historic floods to see how closely we could check the flood marks that we had. This business or effort of computing flow profiles for the historic flood and checking those profiles against flood marks along a flood proved to be a very fruitful way of improving flood profiles and of putting question marks on certain flood marks that we thought were good. And again it was because of this we could go back into the field to check these flood marks to see if they were really as good as we thought they were when we first got them.

DR. CRAWFORD: How did you determine flood marks? What did you look for?

MR. BOWMASTER: Well, once the Corps of Engineers came into the picture, they had made quite an effort to mark the height of past floods and so it was because of their work that we had flood marks for the Flood of 1936. The Corps of Engineers had also made some effort to collect flood marks on historic floods. Generally these flood marks as I mentioned earlier were where some person living along the river had taken out his jack knife and made a notch in the door casing of his house and perhaps he even carved in there the date. Usually they did not carve the date, however, they just made a notch.

Other cases they put a spike in a tree, other cases they could point out in the living room of the house a dark line that this is where the water came to. So these were the kind of things that we were able to resurrect that we spoke of as flood marks. Of course we had stream gauges in operation for the later floods and so we knew accurately the elevation of those floods at the stream gauges. Our problem was to collect enough flood marks along the river between the gauges to see just how high the flood was.

DR. CRAWFORD: Were there any natural features such as trees or bluffs that you were able to trace marks from?

MR. BOWMASTER: We could often get marks as I mentioned where someone had put a spike in a tree. We also often found on rocks where somebody had gone out with paint and painted a line to mark the height of the flood on the rock. But again the spikes were permanent the notches cut in door casings were permanent. Sometimes people would tell us the flood just came to the top of this rock. Often the rocks were not too large and they became moved and often the memory of the people as to when the flood occurred was faulty, so that it proved to be quite a task to really pin down the flood marks.

DR. CRAWFORD: From that information you were able to estimate the water control that you would need to prevent those floods, I suppose?

MR. BOWMASTER: That was one of the things we were after. Again Mr. Kimball was very much interested in determin-

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ing a maximum probable flood and he approached this from a great many angles.

One of the angles was to determine the flow of historic floods, determine what was the maximum flood of record both in height and in stream discharge. And he was very much interested in keeping to date a chart in which stream-flow was plotted against drainage area. It has been a long time since I have looked at one of those charts, but as I recall both stream-flow and drainage area were on a logarithmic scale. By plotting discharge against drainage area for a large number of points in the Tennessee Valley we were able to draw a strait line that was sort of an enveloping line of all of these marks and again whenever a mark fell above that line (higher than the line) this was reason for wondering if our flood data on which that mark was based was good. It was an opportunity to maybe go back to the field again and check to see if our data was good. So that a great deal of effort was spent in trying to develop the maximum probable flood here in the Tennessee Valley. Of course, we wanted this both for design of the dams themselves, design of the spillway capacities, and we also wanted of course, for determining the size of flood for which we should design the protective works at Chattanooga and elsewhere on the river.

DR. CRAWFORD: If your information only went back to about 1867
 how could you be sure that greater floods had not
occurred before and therefore could again?

MR. BOWMASTER: This is why we were so interested in the diaries.

In going back to 1867 we were going back nearly a hundred years. And by means of the diaries we were able, we thought, to go back another hundred years perhaps in determining the maximum flood that has occurred. We felt that we were in a position to say that the 1867 Flood was probably the greatest of floods that occurred on the Tennessee River in the Knoxville to Chattanooga area in the past 200 years. So we could pin it down that way.

Of course, part of this whole study was to expand our consideration to areas outside of the Tennessee Valley, particularly in the New England states where the records went back farther and to compare these maximum flood records on some of those streams with the maximum flood record on the Tennessee River. In the process we ended up with one diagram that I recall, that covered the Eastern United States. And it showed the greatest floods that have occurred any place in the Eastern United States. But again our history was going to go back only perhaps 200 years or so.

And so we were interested in knowing whether that 300 years is a reasonably representative sample or if we had had a record of 1,000 years instead of 200 years, would the maximum flood record in that 1,000 years be much higher than the maximum flood in the 200 year period. Again this is a statistical study.

We had some help in going back to flood records in Europe where the records have been kept for longer periods of time and particularly the flood records of the Nile River in Egypt that went back several thousand



years. All of this seemed to indicate that if you had a maximum flood record over a period of 200 years the maximum flood record of 2,000 years would not be significantly higher. But this was all part of those early studies.

DR. CRAWFORD: Then you accumulated all possible information about this--not just what was available during say the time that material about the Valley had been written?

MR. BOWMASTER: Yes, again, Mr. Kimball was a very thorough man. He liked to consider things from all angles. He was convinced that one of the most important things that we had to do was to determine this flood that he called the maximum probable flood. They had done a great deal of pioneering work along this line with the Miami Conservancy District and so he was really just continuing that line of work. We were approaching it as we have described from the standpoint of historic floods, but this was only one approach.

We also approached it from the standpoint of storms--historic storms. So we were collecting what we referred to as isohyetal maps of all storms of record in the eastern United States. An isohyetal map being a map like a topographic map except that it shows rainfall amounts instead of elevation. We had collected a isohyetal maps and could plot it then of all major storms in eastern United States. We had considered the possibility of those storms coming into this area and this got us into some rather elaborate meteorological studies because the Tennessee Valley is rather unique in that we have mountains to the north of

us--the Cumberland Mountains, we have the Smokey Mountains to the South of us and the storms have a difficult time coming up the Tennessee River. They often get blocked by mountains on either side. So we were looking at it from that angle--all with the view of developing what the maximum flood probably would be. So this was probably one of the most intensive studies ever made up until that time on this subject. True, since that time tremendous advances have been made in flood studies, in meteorological studies. And much of the work that we did in those days--the 1930's and 1940's--is out of date today.

DR. CRAWFORD: Was this your major responsibility in 1934, Mr. Bowmaster?

MR. BOWMASTER: Well, we certainly devoted a tremendous amount of time to this kind of work in 1930's let's say.

We were at that time looking at the plans for a series of dams and reservoirs on the Tennessee River and its tributaries and we were also looking at the need for flood protection at Chattanooga. It became clearly evident that Chattanooga could not be protected from floods either by constructing a series of upper stream reservoirs or by constructing levees at Chattanooga. Instead it became increasingly evident that it would require a combination of these. Of course the flood for which these structures were to be designed was extremely important. I think Mr. Kimball felt very conscientiously that if levees were to be built at Chattanooga it would be a disservice to build those levees too low. In his conservative, New England manner he felt very strongly that any

levees that were built should be built high enough to withstand what he was terming the maximum probable flood. If they were not built that high and that strong the people of the city might be suddenly flooded if those levees were overtopped and the levees in that situation could do far more harm than good and so in his conservative New England manner he wanted to be absolutely sure that any system of levees would be high enough and strong enough to give the protection.

DR. CRAWFORD: Did this information you accumulated have any effect on the design or size of Norris Dam?

MR. BOWMASTER: No, it didn't, because Norris Dam had already been designed by the Corps of Engineers and Bureau of Reclamation. I suppose it was one of those early decisions that had to be made by congress or the TVA Board and apparently the decision was to go ahead full speed with the construction work in order to put people to work using the design--preliminary designs--that the Corps of Engineers had made, but getting the Bureau of Reclamation by contract to proceed with the detailed design so that the construction could get under way immediately. So TVA was not particularly involved in determining spillway capacity of Norris Dam or the general planning features of that sort.

DR. CRAWFORD: Did this information affect the design and the size of the dams built subsequently?

MR. BOWMASTER: Oh yes, this information was the basic information used in determining or in helping to determine the size and height of the tributary storage reservoirs that were built and more particularly in determining the spillway capacity of those

reservoirs and dams. That kind of information has been used throughout the history of TVA, being refined from time to time and being supplemented for a particular project, but it was basic.

DR. CRAWFORD: What other responsibilities did you have and what other work did you do in your early experience with TVA?

MR. BOWMASTER: I mentioned that in my early experience I was with the flood control branch. I was there until about 1946 as I recall, and we were totally immersed in this whole job of planning for the flood protection of the Tennessee Valley. Determining maximum probable flood was one of the things that required our attention. Along with that of course we needed to know how much flood storage capacity should be built and provided for in the various reservoirs that were planned and being built at the time. Some of the dam sites we could get just as much storage capacity as we wanted. Norris was of that type. Hiwassee was almost the same way. These two dams and reservoir were in sparsely inhabited, mountainous territory where land was relatively inexpensive, where there were not too many people living and so the reservoirs could be built almost as large as you wanted to build them. On the other hand some of the other reservoir projects were in areas that were more highly developed, were more roads, more railroads, more people and costs became extremely high if the reservoirs were raised high enough to provide enough storage capacity as you would like. So that we were at all times making a great variety of studies as to the effect of a particular reservoir

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY

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FROM
DR. J. H. GOLDSTEIN

TO
DR. J. H. GOLDSTEIN

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on downstream floods. This of course got us right into the midst of most difficult studies on how to determine the effect of upstream storage on flows at points downstream. Many of the staff members of the flood control branch spent years developing methods of what we referred to as flood routing. This process gradually developed over the years till today the employees of the present Flood Control branch are able to route floods. So that, along with determining maximum probable flood, were two of the major jobs of our group of people.

DR. CRAWFORD: Will you explain a little more about routing floods?

MR. BOWMASTER: Well, this is a rather complicated thing. I'm not sure that we can explain it without trying to draw a lot of diagrams and so on. But let's say that this is the situation. Suppose we are studying a flood--let's just say, it is a flood that occurred in 1917. It is a flood on which we have reasonably good stream-flow rainfall information. That we know for example that the 1917 flood reached a certain height in Chattanooga. It flooded a certain area. It did so many million dollars worth of damage.

Now we want to know that suppose at the time of that 1917 flood Norris Dam had been built and was in operation. How much would the operation of Norris Dam have reduced the discharge of the 1917 flood at Chattanooga, the height of the 1917 flood at Chattanooga and the damage caused? Now this is a rather difficult engineering study. It is not at all simple. Then if you add to this the fact that we are going to consider not just Norris Dam but Hiwassee Dam, and Cherokee Dam, and Douglas Dam and all the other dams of the system. And we



want to know individually and collectively the effect of those floods on the height to the 1917 Flood at Chattanooga. Then you have a great job on your hands. Someone would say just offhand that well, this 1917 Flood at Chattanooga had a discharge of, oh let's say, of a figure of 40,000 cubic feet per second. I might also say, well at Norris Dam, that flood had a discharge of 50,000 cubic feet per second. So that if you built Norris Dam that during that flood you stored all the flow, you did not let any flow by Norris, well then obviously you have reduced the flow at Chattanooga by 50,000 cubic feet per second.

So a little thought will show that that is totally incorrect because we know that that 50,000 flow from the Clinch River at Norris would not get to Chattanooga necessarily right at the time of the peak flow at Chattanooga and even if it did we know that some of that water that makes up the 50,000 cubic feet per second crest at Norris Dam would go into storage temporarily along the Clinch River and the Tennessee River as that flood moves downstream so that if I contribute not 50,000 CFS crest to the flood at Chattanooga but a far smaller amount, it might be only 20,000 or 10,000. The question is how much. And so this became a process of determining day by day what the flow is of the Clinch River at Norris, how much of that flow each day goes into storage in the reservoir, and routing, as we spoke of it, that flow downstream from Norris to Chattanooga, determining day by day how much of that water goes into temporary storage along the Clinch River and the Tennessee River. This meant that we would need to, in effect, think of the Clinch River



and Tennessee River as being a whole series of small reservoirs in which we would see day by day how much water goes into storage in each one of these and how much water comes out. So eventually you would determine how much water comes out of the last one of these temporary storage reservoirs just above Chattanooga.

Well, this gets extremely complicated, of course. To add to the complicated picture we were then in the process of planning or building some reservoirs on the main stem of the Tennessee River between Norris Dam and Chattanooga. So we had to deal with the operation of each one of those. As I say, it was an extremely complex picture. No one up to that date had devised a satisfactory method of flood routing. We did a great deal of work. Ed Rutter was the one basically responsible for this and I suspect it occupied most of his attention for a good many years between 1934 and the time he retired from TVA.



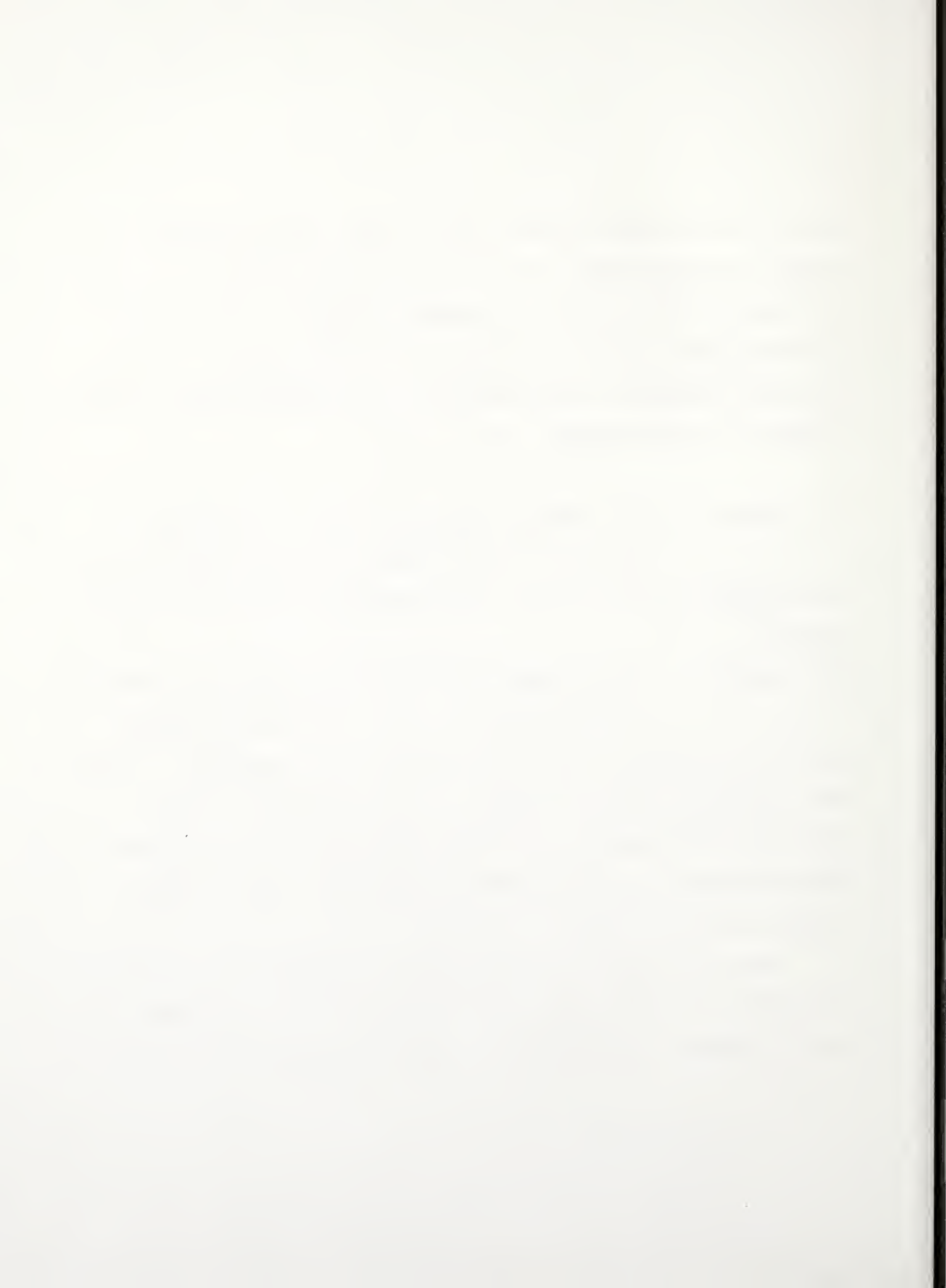


THIS IS THE ORAL HISTORY RESEARCH OFFICE OF MEMPHIS STATE UNIVERSITY. THIS PROJECT IS THE "ORAL HISTORY OF THE TENNESSEE VALLEY AUTHORITY". THE DATE IS JANUARY 31, 1975. THE PLACE IS KNOXVILLE, TENNESSEE. THE INTERVIEW IS WITH MR. WYLIE BOWMASTER. THE INTERVIEW IS BY DR. CHARLES W. CRAWFORD, THE DIRECTOR OF THE ORAL HISTORY RESEARCH OFFICE OF MEMPHIS STATE UNIVERSITY. TRANSCRIBED BY BETTY WILLIAMS. INTERVIEW # II

DR. CRAWFORD: Mr. Bowmaster, let's get over the general outline of your TVA career after your initial water control planning activities. What did you do after completing your first work for the Authority?

MR. BOWMASTER: Well, I came to TVA in 1934 and I stayed in the Flood Control Section which later became the Flood Control Branch of the Division of Water Control Planning until about 1946. At that time I moved into the Division Office. My job at the Division Office turned out like so many jobs to be whatever you make it to be. But there had been an elderly man in the office who was retiring and so, at least on paper, my job was to take his place.

I found that he had been spending most of his time writing a planning chapter for the technical reports that TVA was publishing at the time. From the very earliest days TVA had in mind publishing a technical report or a



monograph that would describe each one of its projects. This has been done generally for each dam, steam plant and other major projects. These are bound printed reports, varying in length from a few hundred to nearly a thousand pages. They are written, of course, after a project has been completed and they do cover all phases of that project beginning with the planning, going through the design, the construction, and then into the operation.

The Division of Water Control Planning had always been involved in the planning so one of the jobs of this office was to write the planning chapter for these final reports. However, I soon found that there were so many other things that needed to be done around the Division Office that I became involved in those more than writing the planning chapter of the report. One of these was personnel administration; a second one was budgetary planning and control. So these became after 1946 some of my main areas of concern in addition to reporting of one sort and another.

DR. CRAWFORD: What other work did you do in this position?

MR. BOWMASTER: Well, from 1946 on until I retired in 1970 my concern was primarily in these three areas: budgets, personnel, and reports. There were some other things associated with this of course--one of them was review of projects proposed along Tennessee River and its tributaries by other agencies or by private individuals which would require review under Section 26a of the TVA Act. This section says that no obstruction to navigation, flood control, or public lands could be built or maintained along the Tennessee River or its tributaries until plans had been approved by TVA.



So this meant that we had to review applications that came in for construction for minor dams throughout the Valley, for construction of facilities on the shoreline of the reservoirs or the rivers (boat docks for example) and so I did some of the leg work associated with those. I believe that pretty well covers what I was doing in those years since 1946, although there always were a whole lot of administrative problems that would find a way to my desk.

DR. CRAWFORD: What sort of administrative problems did you get to deal with?

MR. BOWMASTER: Well, whenever you get involved in the two fields of personnel and budgets, you find yourself into practically every administrative problem of the organization. You may have a problem of financing one of the activities that you have been carrying on for years. You [think] it is a rather important activity but financing is becoming difficult and so you look at: Can we reorganize in order to do the job cheaper, [or] can we eliminate either the whole job or portions of the job without affecting our principal activities too seriously, or just what can we do in order to get by with limited funds. And so this was a kind of activity I found myself involved in very much.

DR. CRAWFORD: What were your personnel duties at this time?

MR. BOWMASTER: Well, this is rather a long story and it has changes along the way and I am sure I don't recall the dates.

But TVA had always operated a rather centralized personnel system in which every appointment and every promotion had to be approved by the centralized division of personnel. Well, this centralized personnel operation was becoming a drawback as TVA grew and there was considerable need to decentralize personnel

administration. So the first step was, as I recall, to have someone in each division who would be the representative of the Division of Personnel dealing with personnel matters, and so I became involved there. Sometime thereafter the responsibilities of this person were enlarged and he became known as the Personnel Officer of the Division which meant the paperwork associated with the employment, termination, promotion and all other personnel matters had to go through that office and it also meant as the Washington bureaucracy began to think of more reports needed to deal with personnel officer work began to grow and grow until in perhaps the early 1960's or thereabout it became necessary to employ a separate person just to handle personnel work. At that time I began to drop out of that field although I still had considerable interest in it and involvement because of my involvement with budgets. We can't very well work with budgets unless you also work with personnel, because salaries were the principal cost of our division.

DR. CRAWFORD: What about your budgetary duties? What was involved there?

MR. BOWMASTER: From the very beginning TVA took the position that budgets should be made from the bottom up rather than from the top down. That is, that TVA as an independent agency of the federal government should operate on a budget that was developed in the lowest levels of TVA and gradually built up from there to the top rather than a budget that was built from the top down. Now this meant that in the Division of Water Control Planning we asked each one of our branches--about seven in number--to prepare a budget for that branch. Then our job at the division level was to

The first part of the paper discusses the importance of the study and the objectives of the research. It then proceeds to a literature review, followed by a description of the methodology used in the study. The results of the study are presented in the next section, followed by a discussion of the findings and their implications. The paper concludes with a summary of the main points and a list of references.

The study was conducted in a laboratory setting, using a sample of 100 participants. The participants were divided into two groups, each receiving a different treatment. The results of the study showed that the treatment group received the intervention showed significantly better results than the control group. This finding has important implications for the field of research, as it suggests that the intervention may be effective in improving outcomes. The study also identified several limitations, including the small sample size and the lack of a long-term follow-up. Future research should aim to address these limitations and further explore the effectiveness of the intervention.

The study was funded by the National Institutes of Health, and the results were published in the Journal of Health Psychology. The authors would like to thank the participants for their contribution to the study and the research team for their support and assistance throughout the project.

put all those budgets together to come up with a budget for the division. This may sound rather simple, but it becomes rather complex because almost every branch chief would like to expand his operations into the field of another branch, he would like to have more money than he had last year--he would like to add more people. So looking at budgets you become deeply involved in the whole operation of an organization of people. This becomes even worse when we realize that under our federal government we have several budget reviews each year. It is not just a case of making a budget for one year and then forgetting about it for twelve months until you have to redo it instead it is almost a continuous process that has become more and more complicated as Washington has tried to delve into the intricacies of each organization and try to tell it how to operate. Thus, as far as I was concerned, the preparation and the management of the Division budget, became almost a full time job.

DR. CRAWFORD: I can see that it would. What about your report duties?

MR. BOWMASTER: Again, reporting is one of those things that is what you make it. You can do almost nothing or you can do a great deal. In the Division of Water Control Planning we were doing very little other than contributing to the final project report that I mentioned earlier. It soon became evident to me that it would be desirable for us to pull together some sort of an annual report. We already had much of the information in connection with the preparation of the budgets but we did need to pull that information together. So that along the way we started issuing a report on which we called an annual report and which did tend to pull together in a rather simplified language the activities of the division for the previous year. We



found those reports to be quite useful in a variety of ways, but particularly with the large number of foreign visitors who were continually coming to TVA particularly to the division to learn more about the planning and operation, of TVA Water Control Project. Many times instead of spending hours of reviewing some of these things with the foreign visitors we could talk briefly with them, give them a copy of last year's report which they were always glad to get as something they could carry home with them. So we found that it served that purpose as well as a means of going back to find out when did we do something, or why did we do and so on. So preparation of an annual report became one of my jobs.

Then it also seemed desirable with a division as widespread as ours that we ought to devote greater effort to keeping our employees informed. We had an average of perhaps 600 employees scattered mostly in Knoxville and Chattanooga, but also throughout the Valley in the Hydraulic Data Branch which normally had perhaps 200 employees and in the Maps and Surveys Branch which had about an equal number. These employees were scattered in field offices often not more than three or four or half a dozen in a field office. Their knowledge as to what the division was doing and why it was doing had been neglected. They just had very little contact with people outside of their own office and we felt it would be desirable for them to be better informed and one way of doing this was through a monthly progress report. So again this was prepared in the division office from reports prepared by each branch. This became one of my pets, and I usually had the job of writing it.

DR. CRAWFORD: And you continued doing that until you retired from
TVA?



MR. BOWMASTER: Yes.

DR. CRAWFORD: So, much of your work is evident in the published reports?

MR. BOWMASTER: Yes. That is, it is not my work--my job was really pulling the reports together--getting them down on paper in a readable fashion. This may again sound a little simple, but engineers generally don't like to write and generally as engineers we tend to write complicated sentences, words that are clear to us, but are not clear to the layman, so that what we write is often difficult reading and needs translation. I often tried to improve the writing abilities of our people in branches, trying to get them to put them in a simple form that could be understood. This was also desirable because our work was so closely associated with the work of other divisions and it was desirable that they kept informed as to what we were doing. So copies of our progress report went not only to our employees, but also to various divisions throughout TVA who were interested in what we were doing.

DR. CRAWFORD: What other aspects of your service with TVA would you care to note at this time?

MR. BOWMASTER: Well, as I mentioned coming into the Division Office, the job was originally a reporting job, but firstly because of my interest in some other fields the job began to broaden into a whole lot of things. We have mentioned some of those. I became concerned for example, because here with our 600 employees in some seven branches at one time we found we were occupying office space in Knoxville in some five different



buildings which certainly was not very efficient.

It was certainly inconvenient as far as I was concerned and so we began to plug; "well, why wouldn't it be desirable for us to have all of our Knoxville employees of Water Control Planning in one building?" Well, this idea received some interest in the division within TVA and so again I found myself riding herd on the planning of a new building that was built and is now occupied by the Division of Water Control Planning--The Evans Building. Again this was just one of the sidelights that sort of came into this job.

In the planning of that building we found ourselves in some very interesting predicaments. One minor thing for example, it had become somewhat of a status symbol within TVA to have a rug on the floor of your office. If you didn't have a rug, you weren't very much and so there was always a wrangle as to who had rugs and who didn't. This lead to somewhat of a mechanical problem in that the floors of the building not covered with rugs were normally terazzo. Terrazzo had to be waxed and polished so when you walked from that waxed floor onto a carpet you carried some of the wax and this caused the fibers of the carpet to mat down and showed very much where people walked from the wax onto the carpet.

In planning our new building I became imbued with the idea--why don't we carpet the whole building--get rid of that waxing problem and have a better control? So I believe that the Evans Building was the first building in TVA to be entirely carpeted.

Along with this we were having another problem that had intrigued me because our work was changing all the time, we had changes in the organization



and in the staffing. This usually meant that we were continually tearing out partitions and adding new ones. It had seemed to me that there ought to be some way of using a mountable partition that could be set on top of the carpet and moved as necessary. So again I believe, we were again the first division in TVA to use such removable metal partitions. They have worked out reasonably well. They are now being used (partitions of this type) throughout the office of engineering just because so many changes are necessary as a result of changes in the work and it is quite a simple matter to take down these removable partitions and put them back up in whatever shape you want. So these were the kind of things that somebody had to get into and it usually fell my lot.

DR. CRAWFORD:

Thank you, Mr. Bowmaster.

